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EXAMINER				
PILKINGTON, JAMES				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/736,354

Applicant(s)

BUCKINGHAM ET AL.

Examiner

JAMES PILKINGTON

Art Unit

3656

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-10,12,13,17-26,28-33 and 37-51 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1,2,4-10,12,13,17-26,28-33 and 37-51 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 12/15/03 12/27/05 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the fluted openings must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: the set opening should be - - through bore- -.

Claim Objections

3. Claim 39 is objected to because of the following informalities: line 2, "six" should be - -sixth- -. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1, 2, 4, 6-10, 12, 13, 15, 17-26, 28-33 and 37-51 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is not support in the original filing for "fluted openings." A flute is a groove in a column and there is no support for this in the original filing. It is believed that the Applicant means to claim a flared opening.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 43 and 50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "close" in claims 43 and 50 is a relative term which renders the claim indefinite. The term "close" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. How close is close?

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 2, 4, 5, 6-10, 12, 13, 15, 17-26, 28-33, 37-39, 43-46, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stelle, USP 3,266,059, in view of Irwin et al, USP 3,504,902 and further in view of Heimann, USP 4,534,239.

Re clm 1, Stelle discloses a link assembly for a robot arm comprising:

- A first set of first and second link members (75 and 76) each adapted for limited movement one with respect to the other, said first link member (75) having a through bore (96) extending therethrough
- A second set of third and fourth links members (77 and 78) each adapted for limited movement one with respect to the other, said fourth link member having a through bore (96) extending therethrough

- Wherein the second member (76) abuts the third member (77)
- At least one wire (106 or 108) extending through the bore (96) in the first set links and through the bore (96) in the second set of links
- said at least one wire including a preload so as to maintain said link assembly under compression (Stelle states that all the joints are prestressed (C4/L37-52), if the joints are prestressed and it is the cables that hold the joints together then the cables must be preloaded).

Stelle does not disclose a resilient elastomer disposed between said first and second members and between the third and fourth members and the elastomer is bonded to both of the first and second link members, and is maintained under compression.

Irwin teaches a resilient elastomer (C3/L43-53) bearing disposed between two members (11 and 12) and the elastomer is bonded to both of the first and second link members (bonded at faces 13 and 14) and is maintained under compression (disposed between two elements) for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling (C1/L62-65) thus providing the predictable result of stabilizing the robot arm.

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Stelle and provide a resilient elastomer bearing disposed between two members and the elastomer is bonded to both of the first and second link members, and is sufficiently thin and maintained under compression, as taught by Irwin, for the purpose of providing a flexible joint between two members that

can accommodate lateral displacement as well as be stable against buckling thus providing the predictable result of stabilizing the robot arm.

Stelle in view of Irwin does not disclose that the through bores are flared.

Heimann teaches a bore (16) for a cable that is flared at the opening (see Figure 3) for the predictable result of allowing relative movement between the cable and the bore to prolong the life of the cable (i.e. less wear).

It would have been obvious to one having ordinary skill in the art to modify Stelle in view of Irwin and provide a flare one the end of the through bore, as taught by Heimann, for the predictable result of allowing relative movement between the cable and the bore to prolong the life of the cable.

Re clm 2 and 9, Irwin discloses that the elastomer is made of plastic which is a synthetic rubber and/or a laminate (C3/L43-68).

Re clm 4, well a specific thickness is not disclosed by Irwin it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized a specific thickness range in order to conform to the compressional force inputs, and/or cost specifications of the assembly, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art.

Re clm 6, Irwin discloses each surface of the elastomeric layer contiguous the member is secured (compressed between the members 11 and 12) so that in operation, relative movement between the members produces shear movement within the elastomer, the arrangement being such that the thinness of the layer reduces the tendency towards compression thereby imparting improved stability for the positioning of the components.

Re clm 7, Irwin discloses the elastomer means comprising a plurality of layers of elastomer (see Figures 3-8).

Re clm 8, Irwin discloses an interleaving rigid layer (17a-c and 20) is bonded to adjacent elastomer layers (16) to separate one layer from its neighbor (see Figures 6-8).

Re clm 10, Irwin discloses the interleaving layer (17a-c and 20) between each layer of elastomer (16) is of a material, which is bondable to or capable of being keyed to the elastomer (C3/L43-55).

Re clms 12 and 13, Irwin discloses that the interleaving layer comprises a metal layer, a resin layer, glass fiber, or a mat of either woven or unwoven material (C3/L43-55, Irwin discloses metal or plastic).

Re clm 15, Stelle discloses said at least one wire (106 or 108) comprises control means for controlling the movement (the wires are control means connected to a module) of said link assemblies within the segment.

Re clm 17, Stelle discloses that the control means comprises 3 wires (not shown in detail but Figure 5 shows multiple holes capable of receiving the wires also see C2/L48-50).

Re clm 18, Stelle discloses that the wires (106, 108) are tensioned to maintain the links under compression, the arrangement being such that application of differential tension between the wires causes or allows the segment to move or bend.

Re clm 19, Stelle in view of Irwin discloses that the first link member comprises an outer disc (98) having holes for control wires (Figures 5 and 6) and the second link member comprises an inner disk (88) which is adapted to be disposed generally inwardly of the outer disc (98) and which a central bore (94) which has a bore to accommodate at least one of control and power means (100) for the work head and a rubber disc layer (Irwin).

Re clm 20, Stelle discloses a plurality of said segments (75-80) in which control means is provide for each segment.

Re clm 21, Stelle discloses each segment terminates in an end cap having wire conduit means for the control wires of other segments of the arm and anchorage means arcuately spaced about the cap for securing the control wires for the segment in question (Figure 6).

Re clm 22, Stelle discloses at least one of the members of each link is provided with means for guiding the wires from one end of the segment to the other (the holes).

Re clm 23, Stelle discloses each wire is disposed externally of the segment links and terminates in a ferrule (110, 112).

Re clm 24, Stelle discloses that each control wire is operated by an actuator (C3/L3-17).

Re clm 25, Stelle discloses each that each cable is provided with an actuator. Also, it would have been obvious to one of ordinary skill in the art at the time of the invention to pass the cables around pulleys to help align the cables before entering the segment.

Re clm 26, Stelle discloses each link is produced as a pair of half links which permit back to back assembly, the arrangement being such that an inner link (88) and an outer link (98) may be assembled with its associated bonding layer to form unitary link components (75-80), a plurality of which together can be assembled to form a segment.

Re clm 28, Stelle discloses locating dowels (rounded portion of 88) provided in mating holes (90).

Re clms 29 and 30, Stelle discloses an external sleeve (86) which is a bellows-type sheath (see Figure 4).

Re clm 31, Stelle discloses that the sleeve comprises a material and a configuration which is selected to increase the torsional stiffness of the arm (rib portions can only compress until the contact one another).

Re clms 32 and 33, the sleeve is capable of being filled with a lubricant.

Re clm 38, Stelle disclose that the second link member (76) abuts the third link member (77).

Re clm 39, Stelle in view of Irwin and Heimann discloses a third set of link members including a fifth (Stelle 79) and a sixth link member (Stelle 80), each adapted for limited movement one with respect to the other, said fifth link member (Stelle 79) having a third through bore (Stelle 96), wherein the third bore is flared (Heimann) and a resilient elastomer between the fifth and sixth link (Irwin).

Re clm 43, Heimann disclose that the flared bore (16) is provide with a diameter such that said wire extends in close tolerance through said opening.

Re clm 44, Stelle discloses that the third and fourth links (77 and 78) include a central bore (94).

Re clm 37, Stelle discloses a link assembly for a robot arm comprising:

- A first set of link members including:
 - A first member (75) having a first through bore (96)
 - A third member (76)
 - Said first (75) and said third (76) members adapted for movement with respect to each other
- A second set of link members including:
 - A fourth member (77)
 - A sixth member (78) having a second through bore (96)
 - Said fourth (77) and said sixth (78) members adapted for movement with respect to each other

- At least one wire (106 or 108) extending from said first member (75) to said sixth member (78) said at least one wire including a preload so as to maintain said link assembly under compression (Stelle states that all the joints are prestressed (C4/L37-52), if the joints are prestressed and it is the cables that hold the joints together then the cables must be preloaded).
- Wherein the first and third members (75 and 76) are configured in a cooperating mating relationship
- Wherein the fourth and sixth members (77 and 78) are configured in a cooperating mating relationship

Stelle does not disclose a resilient elastomer disposed between said first and third members and the fourth and sixth and the elastomer is bonded to both of the first and second link members and the fourth and sixth members, and is maintained under compression.

Irwin teaches a resilient elastomer (C3/L43-53) bearing disposed between two members (11 and 12) and the elastomer is bonded to both of the first and second link members (bonded at faces 13 and 14) and is maintained under compression (disposed between two elements) for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling (C1/L62-65) thus providing the predictable result of stabilizing the robot arm.

Upon the combination said adjacent spherical surfaces of said first, second and third link members (or fourth, fifth and sixth) are keyed or bonded to one another such

that during articulation of the arm said third link (Irwin) rotates about a point of rotation relative to said first link and the distance between the spherical surfaces (88, 90) of said first and third links remains substantially constant; and said elastomeric material is maintained under compression by said at least one wire such that substantially no compressive deformation of said elastomeric material occurs during rotation.

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the teachings of Stelle and provide a resilient elastomer bearing disposed between two members and the elastomer is bonded to both of the first and second link members and the fourth and sixth link member, and maintained under compression, as taught by Irwin, for the purpose of providing a flexible joint between two members that can accommodate lateral displacement as well as be stable against buckling thus providing the predictable result of stabilizing the robot arm.

Stelle in view of Irwin does not disclose that the through bores are flared.

Heimann teaches a bore (16) for a cable that is flared at the opening (see Figure 3) for the predictable result of allowing relative movement between the cable and the bore to prolong the life of the cable (i.e. less wear).

It would have been obvious to one having ordinary skill in the art to modify Stelle in view of Irwin and provide a flare one the end of the through bore, as taught by Heimann, for the predictable result of allowing relative movement between the cable and the bore to prolong the life of the cable.

Re cdm 45, Stelle disclose that the third link member (76) abuts the fourth link member (77).

Re cdm 46, Stelle in view of Irwin and Heimann discloses a third set of link members including a seventh member (Stelle 79) and a ninth link member (Stelle 80), each adapted for limited movement one with respect to the other, said seventh link member (Stelle 79) having a third through bore (Stelle 96), wherein the third bore is flared (Heimann) and and an eighth member adjacent the seventh being a resilient elastomer (Irwin).

Re cdm 50, Heimann disclose that the flared bore (16) is provide with a diameter such that said wire extends in close tolerance through said opening.

Re cdm 51, Stelle discloses that the fourth and sixth links (77 and 78) include a central bore (94).

Allowable Subject Matter

10. Claims 40 and 47 and those claims depending therefrom would be allowable if rewritten to overcome the rejection(s) and objections set forth above and include all of the limitations of the base claim and any intervening claims.

Response to Arguments

11. Applicant's arguments with respect to claims 1 and 37 have been considered but are moot in view of the new ground(s) of rejection.

12. Regarding Applicants remarks from page 12 that Stelle in view of Irwin does not disclose the second member abutting the third member: It is noted that this feature is not recited in the independent claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Pilkington whose telephone number is (571) 272-5052. The examiner can normally be reached on Monday-Friday 8:00AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571) 272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES PILKINGTON/

Examiner, Art Unit 3656

10/31/08

/Richard WL Ridley/

Supervisory Patent Examiner, Art Unit 3656